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AUTHOR(S):

Echigo, Kazunori

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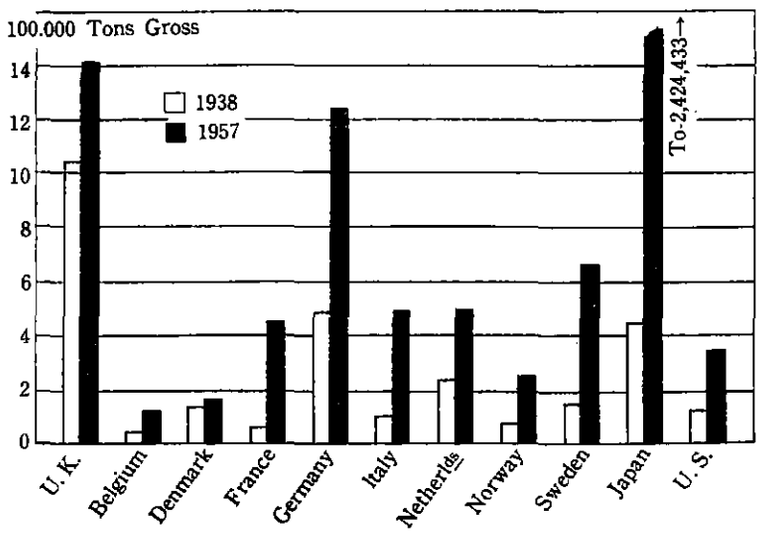
DEVELOPMENT OF POSTWAR JAPANESE SHIPBUILDING INDUSTRY AND REVIVAL OF MONOPOLY
——PARTICULARLY, PROBLEMS OF RATIONALIZATION AND GROUPING IN THE INDUSTRY——

by Kazunori ECHIGO*

I

It is already old news that with the gradual increase of yearly built tonnage of ships in post-war Japan, in 1956, she was able to reach the top, surpassing Great Britain which had always maintained the lead. (see chart 1). The supremacy of the Japanese giant corporations that control shipbuilding industry can be clearly seen by the fact that, in 1956, six out of ten top

Chart 1.



Note; ① Source: *Manchester Guardian*, April 18, 1958.

② "There have been important changes in the world pattern of shipbuilding since the war. The chart shows the comparative tonnage of merchant shipping launched by the main shipbuilding countries in the years 1938 and 1957–last year's huge figure for Japan is too great to be accommodated on the chart. An article in the British Iron and Steel Federation's quarterly, "Steel Review," published yesterday, points out that British yards have been handicapped in recent years by a shortage of steel plate, and by labour troubles. "If these could be overcome an annual output capacity of at least 1,750,000 tons could be achieved, possibly more." But as the chart shows, competition from foreign yards is increasing sharply. (Figures from Lloyd's Register of Shipping.)"

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* The Assistant Professor of Economics at Kansai University.

shipbuilding yards in the world were Japanese yards.[1)]

When comparing the volume of newly built tonage of pre-war Japan and post-war days, in 1951, it was already over the level of pre-war days as shown in Table 1. If the volume of output is considered an index to the development of the industry, it can be said that the shipbuilding industry

Table 1. Tonnage of Newly Built Ships (over 100 tons)

Year	Total	Cargo	Cargo & Passenger	Passenger	Tanker	Special	Fishing	Export	War-Ship
1934	145	86.4	15.8	7.1	19.3	10.9	5.3	—	6.2
35	142	92.9	20.9	2.8	17.9	5.0	3.0	—	17.3
36	428	127.0	35.6	2.5	51.0	9.4	21.3	—	11.7
37	247	262.6	66.9	1.5	38.0	16.7	42.5	—	37.1
38	401	287.4	11.2	1.3	32.3	22.9	46.0	—	27.7
39	333	215.2	49.8	—	56.0	9.8	2.6	—	22.1
40	307	202.0	79.0	3.5	13.5	7.1	2.1	—	47.6
41	241	161.8	36.5	13.5	9.2	17.2	2.9	—	88.6
42	293	188.0	34.4	—	20.3	46.6	3.8	—	162.9
43	801	368.2	29.7	0.9	266.1	138.8	0.8	—	109.2
44	1,730	958.5	—	0.4	673.9	92.1	5.5	—	204.8
45	608	455.8	—	0.4	99.4	49.7	2.3	—	108.6
46	118	80.2	—	—	16.2	7.3	13.9	—	—
47	64	39.8	—	1.6	1.5	6.8	14.4	—	—
48	163	89.4	20.0	27.5	1.1	25.5	17.0	0.8	—
49	159	140.4	—	—	10.0	1.2	3.7	3.7	—
50	227	105.8	—	—	37.7	3.1	4.3	76.0	—
51	443	313.2	—	0.9	62.3	10.4	20.7	35.2	—
52	504	356.6	8.4	0.3	104.7	4.2	6.3	23.5	0.7
53	707	233.8	—	0.8	152.7	2.3	10.6	306.9	—
54	412	171.7	10.6	0.9	83.8	2.7	32.0	110.9	0.9
55	502	177.7	1.5	0.2	15.3	8.8	37.6	261.4	1.6
56	1,529	259.1	2.0	0.3	98.7	1.6	48.8	1,119.0	6.6

Note; ① Source: *Transportation Ministry, Statistical Handbook of Shipping*, 1957.
② Unit: 1,000 g. t., for warships; 1,000 displ. tons.

1) No. 1 Mitsubishi Shipbuilding & Engineering., Nagasaki
No. 2 Deutsche Werft, Hamburg
No. 3 Mitsubishi Nippon Heavy-Industries., Yokohama
No. 4 Götawerken, Göteborg
No. 5 Harima Shipbuilding & Engineering., Aioi
No. 6 Kawasaki Dockyard Co., Kobe
No. 7 Eriksbergs Werft, Göteborg
No. 8 Mitsubishi Heavy-Industries, Reorganized., Kobe
No. 9 Kieler Howaldtswerke
No. 10 Hitachi Shipbuilding & Engineering, Innoshima
(according to the investigation published in *Glasgow Herald Review*.)

had recovered the pre-war level in that year when the demand for ships was incresed by the Korean War and in which orders were given twice during the Seventh Shipbuilding Progam. Moreover, in 1956, the volume of construction nearly came up to that of 1944 (during the war) which was the peak in the history of Japanese shipbuilding and in 1957, it went beyond this level. It is certain that the shipbuilding industry has now attained a level that is far beyond that of pre-war days.

But the recovery in the shipbuiliding industry in this sense does not mean that it has returned to a situation similar to that of pre-war days. It is necessary to note the fact that fundamental conditions in the shipbuilding industry have greatly changed whereas the volume of output has increased.

Table 2. Tonnage of Existing Merchant Ships (over 100 tons)

Year (Dec.)	Total	Cargo	Cargo & Passenger	Passenger	Tanker
1934	3,862.0	2,730.9	875.4	125.4	130.1
35	3,889.8	2,716.4	889·8	128.3	155.4
36	4,051.2	2,809.5	908.6	137.6	195.5
37	4,408.3	3,078.9	944.1	142.1	243.3
38	5,038.4	3,628.9	960.9	145.0	303.6
39	5,382.4	3,893.2	1,006.3	113.0	369.9
40	5,682.7	4,121.7	1,042.1	141.3	377.6
41	6,094.3	4,424.1	1,134.6	134.7	400.8
42	5,366.5	3,796.7	1,023.4	119.7	426.6
43	4,764.1	3,242.6	839.2	84.8	597.4
44	3,581.4	2,217.4	458.2	81.8	824.0
45	1,344.1	987.1	113.5	75.1	168.4
46	1,384.9	1,024.4	113.5	75.1	171.8
47	1,468.1	1,087.7	124.5	75.8	180.1
48	1,554.9	1,132.1	155.3	70.5	197.0
49	1,683.6	1,227.2	131.9	77.6	246.9
50	1,711.4	1,240.4	112.3	77.9	280.9
51	2,282.7	1,742.6	94.2	73.4	372.4
52	2,734.9	2,143.7	80.9	62.7	447.6
53	3,046.0	2,286.0	107.2	56.3	596.4
54	3,292.7	2,434.0	123.0	52.7	683.0
55	3,394.9	2,551.0	118.4	51.5	674.3
56	3,724.6	2,827.2	109.7	51.3	736.5
57 (Jun.)	4,050.9	3,109.1	111.0	51.7	779.1

Note; ① Source: Same as Table I.
② Unit: 1,000 g. t.

The first among the changes is the remarkable decrease in the construction of warships. It is said that a displacement ton in warships is equal to four gross tons in merchant ships. It may be seen from Table 1 that the volume of warships which was comparatively large as explained above, formed a fairly large part in the total volume of ships built during the war. In pre-war days, also, for example, in the period from 1926 to 1931, the percentage of warships built in private yards was 42% to 58% of merchant ships.[2] But as seen from Table 1, it had decreased to a very small amount after the war.

Second, is the weakened situation of Japanese shipping. As shown in Table 2, the tonnage of Japanese ships which was 6 million gross tons and placed third in the world after Great Britain and the U. S. in 1941, that is just before the war, diminished to 1300 thousand gross tons at the end of the war. Moreover, with the withdrawal of government indemnification of war losses, shipping companies lost their accumulated capital at one stroke and their independent revival or recovery after the war was made difficult.[3]

In addition to this difficulty, the monopolistic control by the Shipping Control Association continued in the period just after the war and overseas shipping was prevented by foreign trade control by the Occupation Forces. The full scale revival of Japanese shipping, such as the return to private administration since 1950 and the construction of large-sized ocean going ships which began with the Fifth Shipbuilding Program in 1949 was made possible by financial assistance from government banks and government counterpart funds. This showed an unprecedented weak situation in Japanese shipping. Moreover, the volume of construction was from 20 to 30 thousand tons per year and it could hardly match the shipbuilding capacity.[4]

The recovery of the shipping industry through the Planned Shipbuilding Program was financed entirely by governmental funds and by borrowing from commercial banks. Therefore, the sum of borrowed money has accumulated with the progress of Planned Shipbuilding and the sum borrowed for fixed equipment came up to 185.5 billion yen at the end of September 1957.[5] The enormous amount of interest payment has reduced the power to win the freight rate competition and with the fall in the market rate of freight, and excess of ships has been caused, though the tonnage of existing ships is still behind the pre-war level.

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2) See K. Echigo; *Japanese Shipbuilding Industry*, p. 50.

3) Total loss incurred to all shipping companies in Japan due to withdrawal of government indemnification of war losses which amounted to approximately 2, 450 million yen. This amount was over three time the sum of the paid capital of the main twenty companies at that time.

4) For details, see *ibid.* p. 63.

The first among the changes in fundamental conditions in the Japanese shipbuilding industry is the completely weakened and narrowed domestic market for shipbuilding.

On the other hand, her shipbuilding capacity has greatly increased beyond that of pre-war days. For the Japanese shipbuilding industry, in which it was a rule that the industry had always expanded with wars, the World War II was no exception. This may be seen from the fact that the number of yards with the building capacity of over 1,000 tons increased from 41 in 1940, to 56 in 1944 and the number of berths of the same capacity increased from 126 to 133 and the number of docks increased from 70 to 78 during the same years. And most of those yards escaped damage from bombing and of removal for reparations, they were left intact in the period after the war.[6] The number of companies which was 24 in 1937 increased to 49 in 1949 and after that it has shown additional changes (31 in 1950, 34 in '51, 33 in '52, 38 in '53, 40 in '54 and 47 in '55). The increase in the building capacity and in the number of shipbuilding companies are among the second of changes.

The facts mentioned above, i. e. the weakened and narrowed domestic market and on the contrary, the increased building capacity and number of companies, have naturally caused the keenest competition among shipbuilding companies.

Under the strengthened competition, even big companies could not be

Table 3. The Degree of Concentration of output in Top Ten Companies

	1950	1951	1952	1953	1954	1955
1. Mitsubishi Shipbuilding & Engineering.	14.7	18.4	13.4	15.6	19.4	16.6
2. Hitachi Shipbuilding & Engineering.	12.1	11.7	11.1	9.7	8.7	11.6
3. Harima Shipbuilding & Engineering.	11.0	7.8	12.5	6.8	7.1	7.5
4. Japan Steel & Tube Corp.	4.5	5.8	3.7	9.0	6.1	13.3
5. Kawasaki Dockyard Co.	11.3	12.3	5.9	13.0	5.8	9.8
6. Mitsubishi Heavy-Industries, Reorganized.	9.4	9.3	10.7	5.9	5.4	6.8
7. Mitsubishi Nippon Heavy-Industries.	12.3	7.2	10.4	4.1	4.9	2.4
8. Ishikawajima Heavy-Industries.	1.6	4.2	2.8	2.0	4.2	1.4
9. Mitsui Shipbuilding & Engineering.	11.4	7.4	6.1	7.1	4.0	8.9
10. Uraga Dock Co.	5.8	6.2	2.7	6.3	2.2	3.1
Total	94.1	90.3	83.2	79.5	67.8	81.4
Total for all Japan	100	100	100	100	100	100

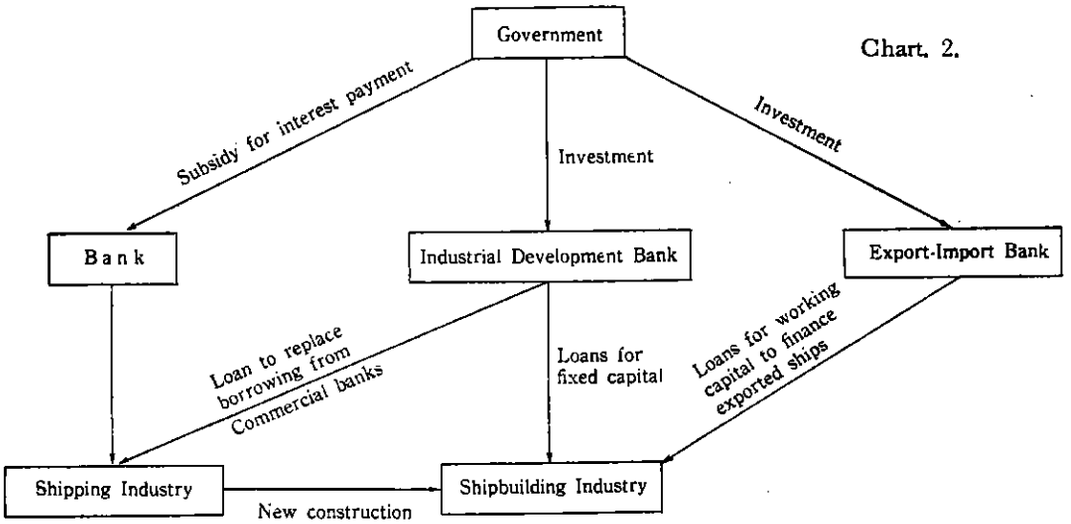
Source: Committee for Fair Trade; *Actual Conditions of Economic Concentration in Japan Industries.*

5) Transportation Ministry; *White Paper on Shipping*, July, 1958.
6) K. Echigo; *ibid.* p. 180.

safe as in the past. Moreover, with the law against excessive concentration of economic power, the Mitsubishi Heavy-Industries. Comp., which had been at the top was divided into three companies and the influence or power held by the top company in the industry was decreased. Therefore, though the total output has been already restored to the pre-war level, the degree of concentration in production among shipbuilding companies has become less than that of pre-war days in which (1937) ten top companies produced 96.7 % of total output as shown in Table 3.

Here it became necessary for big companies in the shipbuilding industry to make strong efforts to secure orders and to expand markets as matters of survival. As shown in Chart 2 the strong post-war shipbuilding policies as well as compulsory measures to create a domestic market by Planned Shipbuilding, have been nothing but a part of the results of strong movements among big shipbuilding companies to expand the market by exhortation, appeals and even the use of force and bribery.[7]

Chart. 2.



Note: *Handbook for Shipbuilding*, 1947, p. 115.

At the same time, each giant shipbuilding companies has been forced to take up measures to promote so-called groupings among companies by firmly combining with particular shipping companies and by reorganizing the shipping industry which will be explained below, in order to expand and stabilize the quantity of received orders. On the other hand, it has been forced to launch into so-called many-sided production in order to compensate for the fall in relative status in the field of new shipbuilding, by production in other fields than shipbuilding.

However, the increased shipbuilding capacity has not been met with the

7) For instance, the so-called shipbuilding bribery case.

amount of orders which has been received by the competition in the weakened and narrowed domestic market. Receiving orders form foreign countries is almost the only way to solve this problem, for the present. Therefore, giant shipbuilding companies have been forced to strive to get orders from foreign countries. Substantial policies for export promotion by the government, for example, measures called a link system, by which the losses caused by unprofitable orders were made up by profits gained from the import of raw sugar, were a reflection of government policy upon the intentions of giant companies.[8]

In order to get orders for ships from foreign countries, first of all, the productive costs have to be decreased so as to compensate for the high price of steel which has naturally been caused by the foreign trade structure in the post-war days. For this purpose, the large-scale rationalization in which the introduction of new techniques, mainly in welding, is the most important, has been almost inevitable. The increase in "labour intensification" and exploitation of small and medium-scaled companies connected with monopolistic companies have been an important part of rationalization.

The increase in output over the pre-war level, as mentioned above, was attained by getting orders from foreign countries which was made possible by the rationalization. Also productive activities of Japanese shipbuilding industry have been carried out under a different market structure from that of pre-war days.[9]

In the following pages, problems of the revival of monopolistic companies in the shipbuilding industry will be concretely analysed, focusing on rationalization and combination or grouping……the symbols of revival which were factors to bring about the revival.

II

In table 4, changes in the price of ships which show the conclusive results of rationalization in the post-war days, are shown. If the price of ships built under the Fifth Shipbuilding Program in 1949, is taken as the basis, the rise in price was only 25 % in the case of the ships built under

8) See Echigo; *Changed and Characteristics of Japanese Shipbuilding Industry in the Post-War Days*, Kansai University, Economic Review, Vol. 5, No. 4.

9) In the period before World War 11, in this country, the only case of shipbuilding for export in which constructed ships of 370,000 dead weight ton for the U. S. during World War 1 according to "exchange agreement of ships with steel between U. S. and Japan." In other words, this industry in the pre-war days was developed for the domestic market. But in the post-war days, particularly after 1956, 70–80 % of the total of newly constructed tonnage has been exported, and the main market has been completely different from that of pre-war days.

Table 4. Change in the Price of Ships

	The 5 th Program	6 th	7 th (first)	7 th (second)	8 th	9 th (first)	9 th (second)	10 th	11 th	12 th	13 th
Steel — Standard price of heavy plate (per ton)	(17,300 yen) 100	190	288.0	288.0	282.0	270.0	214.0	222.0	255.0	298.0	334.0
Steel — Amount used	(3,600 T) 100	98.9	97.2	94.5	92.8	92.8	92.8	83.4	83.4	80.6	80.6
Manufacturing cost — Unit cost (per hour)	(100 yen) 100	150.0	155.0	170.0	200.0	220.0	250.0	280.0	270.0	273.0	313.0
Manufacturing cost — Number of working hours per unit	(1,015,000 H) 100	93.9	90.9	86.1	86.1	78.6	76.8	67.6	61.7	53.8	51.7
Average monthly income for labourer	(8,885 yen) 100	106.0	123.5	148.5	167.0	182.0	192.0	212.0	251.0	275.0	248.2
The price of main engines (per h. p.)	(15,000 yen) 100	120.0	160.0	186.5	200.0	186.5	173.0	147.0	126.5	160.0	233.3
The price of ships (per g. t.)	(79,900 yen) 100	105.0	144.0	204.0	195.0	185.0	151.0	129.0	125.2	137.6	170.7
The price index average — wholesale price	100	126.5	144.0	168.8	163.5	164.0	166.5	161.0	163.0	166.5	178.2
The price index average — metal & machiness	100	187.5	229.2	316.4	303.7	279.2	276.0	248.0	264.0	299.0	343.9

Note; ① The cargo ship of 7,000 g.t. with Diesel engines of 5,000 h.p. taken as standard in this tables.
② Source; Same as Table 1.

the 11 th Program (1955), inspite of the remarkable rise, by 2.55 times, in the price of steel which is the main part of the cost of a ship. On the other hand, the rise in the standard price of ships in Britain was 72 % in the period from 1949 to 1955. The remarkable rise in the price of ships in the world, particularly in Britain, and the relative fall in the price of ships in Japan which was caused by rationalization were the main reasons for the increase in export of ships, as well as the rapid delivery (because there was more room in berths owing to the small domestic market.)

It can be said that measures for rationalization consisted not only in the decrease in the quantity of used materials which was caused by the improvement in welding methods and by the introduction of the block-building method or in the decrease in the number of necessary working hours to build a ship caused by the rise in productivity, but also the decrease in the quantity of used materials and in the number of working hours which was caused by great " labour intensification " or the strengthening of exploitation of related small scale companies by the use of a strong bargaining position. Of course, the rise in labour productivity must be distinguished from the increase in " labour intensification." The former is related to the utility value and yields the same value (in the sense of labour-value theory) during the same working hours. The latter yields more value during the same working hours, because the increased quantity of used labour, though the former lowers the value per unit of commodity.

But in the actual process of production, aiming directly at lowering cost, the two things mentioned above, usually are carried out, closely combined with each other. Therefore, it is difficult to clearly discern the two kinds of effect. According to statistics, we must be careful of the fact that even the increase in output and the decrease in production cost which are really not results of the rise in the labour productivity, are often explained purposely as a result of the rise in productivity.

As shown in Table 5 and 6, in spite of the increase in tonnage of launched ships by about three times in the period from 1953 to 1956, while the number of labourers increased from 79,000 to only 110,000 and monthly working hours per man increased from 198 to only 213, and the tonnage of launched ships per man greatly increased. But this fact is not only the result as often stated, of the increase in labour productivity but the result of the combined effect of the increase in labour productivity, " labour intensification " and the degree of dependence upon sub-contracted work to be given to small-scaled companies.

Table 5. The Number and Composition of labourers

	1952 jun.	1953 dec.	1954 jun.	1955 jun.	1955 dec.	1956 jun.	1956 dec.	1957 jun.
Regular Employees	59,319	61,512	61,713	59,863	59,308	61,816	61,496	62,725
Temporary Emp.	10,124	6,651	4,931	3,745	7,592	10,105	12,264	15,494
Sub- Cont. Emp.	9,116	9,467	8,361	11,655	18,641	25,751	32,895	32,971
Total	78,559	77,630	75,005	75,263	85,541	97,672	106,655	111,190

Note; ① Source; Department of Shipping of Transportation Ministry.
② In this investigation, 25 yards were chosen.

Table 6. Number of working hours and wage

	Tonnage of launched ships(1,000t)	Monthly working hours per man	Monthly wage payment in cash (yen)
1952	582	197.8	18,393
1953	458	197.9	21,027
1954	303	192.2	21,654
1955	736	204.1	24,649
1956	1,544	212.5	28,242

Note: ① Source; Same as Table 5.
② Only regular employees are considerd.

According to a common view, the history of rationalization, which brought about the rise in labour productivity, can be divided into three periods. The first is the period, from 1950 to the next year, in which rivetting was changed to welding; the second is the period until 1953 or '54 in which the block-building method was adopted; the third is the period after 1955 in which production equipment such as berths were enlarged, as newly built ships became larger and larger.

If we look at the statistical data of investment for fixed capital, shown in Table 7, and if we ignore, for the present, the item titled, "machines" which, as will be explained below, reflects the expansion of equipment for manufacturing frames and the advance of many-sided production in the post-war days, it is clearly seen that the main part of investments have been for the expansion of equipment for processing and assembling the body of ships (welding) and of equipment for conveying and electric power supply necessitated by the block-building method. It can be seen that the investment for berths greatly increased in 1955, for the first time.

Table 7. Fixed Investment and Financial Sources (%)

	1950	1951	1952	1953	1954	1955	1956	Total
1. Equipment for processing and assembling (welding) ship body	10.8	19.7	24.9	13.1	9.1	20.0	13.2	16.2
2. Equipment for conveying	9.3	18.3	20.3	17.4	8.1	19.1	17.9	17.0
3. Docks	1.6	1.2	13.2	4.7	2.9	0.7	1.2	3.4
4. Quays	1.8	2.6	0.6	5.1	5.3	1.8	3.5	3.0
5. Berth	2.3	3.4	7.5	0.5	2.5	13.3	10.5	7.3
6. Sources of Electric Supply	4.0	4.3	4.4	2.9	1.2	3.7	3.1	3.2
7. Machines	33.0	30.6	15.8	35.1	38.8	22.1	29.7	28.4
8. Equipment for indirect uses for production	15.3	6.8	4.7	8.2	16.9	7.7	11.1	9.5
9. Others	21.9	13.1	8.6	13.0	15.2	11.6	10.1	12.0
Total	100	100	100	100	100	100	100	100
I. Increase in Capital	4.3	2.2	16.7	12.2	5.1	3.6	21.3	11.5
II. Reserve	10.0	18.5	34.6	36.0	57.9	43.2	45.2	39.1
III. Borrowing from Commercial Banks	40.1	31.8	25.8	20.6	18.4	49.3	22.7	29.5
IV. Borrowing form Industrial Development Bank	0.7	14.7	17.3	15.8	8.8	2.4	2.9	8.1
V. Bonds	44.7	32.8	5.6	5.4	9.8	1.5	7.9	11.8
Total	100	100	100	100	100	100	100	100

Note: ① Source; The investigation by Department of Shipping, Transportation Ministry.
② Figure in the table show total of main 19 factories.
③ Figures in lower table show the financial sources.

Changes in production methods which were caused by the introduction of welding and the block-building method can be diagramatically described as follows: (⟶shows the route of transportation)

In rivetting:

materials ⟶ drawing ⟶ boring ⟶ cutting ⟶ bordering ⟶ gouging ⟶ shaping ⟶ fitting ⟶ boring ⟶ gouging ⟶ rivetting ⟶ packing.

In welding:

materials ⟶ drawing ⟶ cutting by gas ⟶ bordering ⟶ shaping ⟶ assembling on the ground ⟶ welding ⟶ fitting ⟶ welding.

Beside the fact that the process of production has been simplified as shown above, (1) it is needless to say that, by the welding method, it is not necessary in drawing on materials to indicate by indenting in advance, positions to be rivetted and work has been generally simplified by this method. Therefore there has been a decrease in the number of working hours per unit of output by 30 %. If monopol gas cutting machines which have been recently imported from Germany, are used drawing is not necessary at all. (2) processes of boring, gouging and fitting-frames have been ommitted.

(3) the welding method made the block-building method possible. While the latter made the former most effective.

In other words, according to the traditional production method, first of all, the keel was laid and cross-plates fitted and then bulk-heads on the inside floor, ribs, outside boards, beams and decks were fitted, conveying materials one by one to the berths. But according to the new block-building method, a ship is devided into several blocks and after each block has been constructed on the ground by the most convenient method, the constructed blocks are conveyed to the berths and assembled. By this method, work on berths have been simplified and the reliability of welding has increased and the number of working hours per unit of output has greatly decreased. Hence, with the increase in "labour intensification," the number of working hours per unit of output has remarkably decreased in 1957 by half, compared with that of 1949, as shown in Table 4.

The remarkable decrease in the number of working hours per unit of output has resulted in the decrease in the necessary number of days for assembling a ship on a berth, in the rise in the rate of turnover of capital and actually in the increase in the shipbuilding capacity on a berth. For instance, the fact that the shipbuilding capacity in Japan which was estimated at 800,000 g. t. in the Strike Report, has increased to 2,500,000 g. t. in the last two or three years, was caused not only by the enlargement of berths mentioned above but also by the shortening of the period of shipbuilding on a berth (the decrease in the number of working hours) which differs from physical expansion. In this sense, it is said that investment for rationalization in the first and second periods mentioned above contributed to the increase in the capacity for production as well as that in the third period.

In addition to such a process to reduce the productive cost, that is investment for rationalization⟶improvement in building method⟶rise in productivity⟶decrease in the number of working hours per unit of output⟶reduction of cost: improvements in building methods have directy brought about the reduction of the necessary amount of steel per unit of output. As shown in Table 4 a reduction was realized by about 20% in the period from 1949 to 1957.

Here, we must note the fact that innovations in techniques and improvements in building methods which were caused by the rationalization in production equipment in post-war days as explained above, were rapidly carried out and brought about outstanding effects in only a few years after 1950 in which a certain amount of orders was received. This fact shows that reduction of shipbuilding costs by the introduction of new techniques was the most important and urgent problem for monopolistic shipbuilding

companies and the progress of their own techniques, equipment and experience which made it possible, had already attained a high level.

These techniques, equipment and experience had been gained from none other than the Japanese Navy which heavily supported this industry in pre-war days and in war-time. For instance, the research and the practice of electric welding carried out by the Japanese Navy was so intensive that it was often said, "Japanese Navy, accordingly electric welding." The Navy applied for the first time in 1928, the welding method to large-sized warships. After the "Fourth fleet case," the Navy continued its research and came to apply it with confidence to a battleship and an aircraft carrier at the time before the war.

As mentioned above, warship building occupied a fairly large part in the total output of private yards in the pre-war days and in war-time. Shipbuilding equipment and shipbuilding engineers who made progress in their techniques and experience by warship building were left untouched after the collapse of the Japanese Navy. In a word this industry imported new techniques from foreign countries in the post-war days, in addition to its inheritance from militaristic Japanese capitalism.

The world's record in the reduction of the number of working hours per unit of output that was made in the construction of the battleship "Yamato," of 70,000 tons, the number of working hours for which equaled that for an aircraft carrier of 30,000 tons shows that a certain method of block-building had already been applied in its construction. During the occupation, N. B. C. (National Bulk Carrier) in the U. S. showed keen interest in the excellent equipment by which "Yamato" had been built. The fact that large-sized, shipbuilding at leased Kure Navy Arsenal yielded better results by the company than expected, shows how great the inheritance was. Similar fact can be seen in any giant private yard as well as in former Navy Arsenals.

The second point to be noted is the fact, as shown in Table 7, of sources of funds for investments in durable equipment, that half of the funds obtained consist of outside borrowing and above all, the borrowing from commercial banks amounts to as high as 30%. This shows that the investments in equipment which were necessary for the rapid development of technical innovations could never be made without depending upon the banks. Therefore, the rationalization of equipment has made great progress only under the monopolistic shipbuilding companies in which as will be mentioned hereafter, banking, shipbuilding and shipping concerns are tightly combined.

As mentioned before, the expansion of welding facilities began in 1950 or thereabouts in the big shipyards but there was a time lag of several years to begin with in small and medium-sized yards. It was only 3 or 4 years

ago, when taking advantage of the so-called" "shipbuilding boom" which started in the fall of 1954, the former need not have encroached on the market of the latter, that the investments in equipment have spread to the small or medium-sized companies. Before that time, they could not afford the minimum level of repairs of necessary equipment, much less the rationalization of equipment and having been abandoned by the banks, their facilities had been left to deteriorate.

Now, the rise of productivity by dint of rationalization of facilities was not the only factor which contributed to the reduction of the cost of a vessel.

Table 8. Comparative National Wage Cost (index)

England	100
Japan	44
Germany	71
Sweden	149
Holland	66
France	—
Italy	74
Norway	102
United States	323
Denmark	119
Belgium	110

① Source: *Shipping, No. 360.*
② Taken 1956.

In the shipbuilding industry, where by its nature, order-production is the usual form and mass production are not easy to get and the cost of wage has a great influence on competitive positions. The wage cost in Japan is much cheaper than that of every shipbuilding country ranging from the U. S. A. to Holland as shown in Table 8. In order to make this low wage cost even cheaper, capitalist has never failed to make every effort which has no direct connection with the rise of productivity. The first was to increase the number of, not the regular workers, but temporary or extra workers and contract workers under inferior conditions. Table 5 above shows that, in spite of the rapid rise of output temporary workers and especially contract workers have increased in great numbers whereas there is almost no increase in regular workers.

Moreover, in proportion to above mentioned rapid increase in output the relative increase in the number of workers as a whole was too small, although the number of contract workers had increased greatly and even if, the rise in labour productivity is overestimated, it is easy to imagine that there was " labour intensification," through such measures such as the ticket system for work units, regulation of overtime, cuts in rest hours and so on. It is easily supposed that the above mentioned rapid increase in production and the drastic decrease in the number of working hours per unit of output were for the greater part attributable to " labour intensification."

Again, the introduction of welding has, indeed played a great role in saving steel materials but it should be also emphasised that this has become more effective in combining with " labour intensification " which made wor-

kers more careful not to produce "scrap" or defective products.

And in spite of the rise in productivity, there was an extension of working hours as shown in Table 6. 212.5 hours a month means about 2 hours over-time every day on the average and these long hours are rare in other industries.

The average monthly income of workers has recently increased nominally. This is supposed to be due, not to the rise of wage-level, but to the augumentation of the factor of an efficiency rating system and to the extension of working hours. The increase in real wages is doubtful.

Thus, the rationalization put forth under the name of the movement for improvement of productivity, indeed has contributed to the reduction of cost and has made possible due to the great number of ships for export, the revival and growth of the shipbuilding monopolies, but it should be remembered that it has brought labourer only instability of employment, i. e., the increase of contract and temporary workers, extension of working hours and "labour intensification."

Lastly, I will add a word concerning the relationship with small and medium-sized enterprises in its effort in the reduction of cost.

As is well known, the shipbuilding industry is an assembly industry and the related industrial products in a narrow sense occupy more than 45% of the cost of a vessel, and those in a wide sense including steel and timber materials amount to as high as 70% or so.

The problem in question is that of small and medium-sized enterprises whose products are such related products as generator engines, auxiliary machinery, refrigerators, valves and cocks, nautical instruments, navigational apparatus, shipping goods and so on. These products form about 17 to 30% of the cost of a vessel.

Among these small and medium-sized enterprises, there are some in sub-contract relationships and others in merely finished goods placement relationships, and among them, there are some in line with the parent company, through sub-contractor associations and others not so.

sub-contracting takes place sometimes in the form of contract for work within the yard with above-mentioned contract workers, and sometimes in the form of contracts for related products usually called "sub-contracted manufacturing." The ratio of these sub-contracts differ according to the yard and also the period, but it is estimated from the actual amount of shipbuilding which is far above the tempo of decrease of working hours per unit and the increase in the number of workers in the shipyards, that the placement of orders with these small businesses has increased generally. It may be mentioned that Table 9 shows the augumentation of the degree of depen-

dence upon sub-contracts among the three monopolistic shipbuilding companies.

Table 9. Three Main Companies, Sub-contract Ratio

	Year	Sub-contract Factories	No. of received Orders (index)
A. Company	1954	142	100
	55	185	193.4
	56	197	770.3
B. Company	1954	383	100
	55	433	137.5
	56	549	311.5
C. Company	1954	140	100
	55	161	162.3
	56	189	386.7

Note: Labour Ministry, Research Bureau; *Labour Monthly Statistical Reports, Vol. 9. No. 12.*

Towards these small and medium-sized businesses in sub-contract relations and in "outside order placement" relations, the shipbuilding monopoly has been forcing its policy of cost reduction in such forms as beating down the price consistently, taking advantage of their "cut throat competition," deferment of payments, reduction of unit cost of sub-contracted products and etc. The details of the above situation can be ommitted here, as there have been many investigations including those made by the Board of Small Businesses.

At any rate, it is worth mentioning that the building of export vessels which made possible the revival of post-war monopolies has been accomplished with the inheritance from the "Imperial Navy" and the adhesion to giant banks, as well as the exploitation of workers and small businesses through such extensive rationalization.[10]

III

With the progress of rationalization, the revival of shipbuilding monopoly involves the reinforcement of combinations between big shipping and banking concerns and its advance into other industries.

The big shipbuilding companies which was forced to compete with each other in a narrower domestic market after the war, must first of all revive and reinforce the combination with shipping firms which belonged to the former same Konzern or the traditional connection with them existing before the war, in order to augment and stablize the amount of orders.

On the other hand, this industry which demands large amounts of funds

10) For details see author's book (K. Echigo; *Japanese Shipbuilding Industry*)

cannot but depend on banking capital in the process of rapid rationalization after the war and above all, the dependence upon banks in the same former Zaibatsu Konzern or leading banks in transactions for borrowing funds at a high ratio has become indispensable. The trend towards this situation is shown in Table 10. The ratio of governmental funds have increased recently and this is supposed to reflect the increase of loans from the Export and Import Bank of Japan, in proportion to the increase of export vessels.

Table 10. Big Shipbuilding Companies and Banks——Financial Grouping——

Big Companies	Period	Chief Bank	Chief Bank Ratio	Other Bank Ratio	Gov't Fund	Old Special Banks
1. Mitsubishi Shipbuilding & Engineering.	1953 sep.	Mitsu-bishi	24.5%	6.5%	19.8%	20.4%
	1956	〃	12.2	2.5	69.3	9.7
2. Mitsubishi Heavy-Industries, reorganized.	1953	〃	19.2	3.3	8.8	15.4
	1956	〃	16.2	4.9	22.6	18.1
3. Mitsubishi Nippon Heavy-Industries.	1953	〃	26.3	2.6	6.2	16.1
	1956	〃	19.8	7.9	22.5	12.0
4. Mitsui Shipbuilding & Engineering.	1953	Mitsui	—	—	70.0	30.0
	1956	〃	—	—	61.0	22.0
5. Kawasaki Dockyard Co.	1953	Daiichi	18.2	—	42.9	16.7
	1956	〃	9.8	—	61.1	12.2
6. Ishikawajima Heavy-Industries.	1953	〃	44.1	—	7.9	4.7
	1956	〃	16.7	—	46.9	5.8
7. Uraga Dock Co.	1953	〃	22.9	—	44.9	4.7
	1956	〃	10.4	—	62.1	5.8
8. Harima Shipbuilding & Engineering.	1953	〃	39.0	—	9.5	—
	1956	〃	5.6	—	77.7	7.5
9. Hitachi Shipbuilding & Engineering.	1953	Sanwa	28.2	—	24.2	15.7
	1956	〃	9.3	—	40.5	23.9

Note; *Fair Trade*, 1957, January.

Also in the shipping industry, the connection of shipping companies with chief banks has become tighter than in pre-war days, because the funds for enlarging its fleet must be provided by loans from banks, cooperatively supplied by governmental loans.

Thus, there are naturally tighter combinations among the three, that is, shipbuilding···shipping, shipping···banking, shipbuilding···banking. This, for example, is indicated in the following drastic features which appeared in the Shipbuilding Program up to the 13 th.

Mitsubishi Shipbuilding and Engineering Company, out of its total of 45 vessels built received orders for 12 from N. Y. K., 8 from Daido Marine Transportation Company, 3 from Mitsubishi Shipping Company, 5 from Toho Shipping Company, Mitsubishi Nippon Heavy-Industries Company, out of its total of 23, 8 from N. Y. K., 5 from Mitsubishi Shipping Company, Mitsubishi Heavy-Industries, Reorganized Company, out of 25, 16 from O. S. K., 4 from Shin Nippon Steamship Company respectively.

On the other hand these three Mitsubishi Companies monopolized 20 out of the 21 for N. Y. K. while the Mitsubishi Heavy-Industries, Reorganized. built all 16 for Osaka Shosen Kaisha (O. S. K.) and the Mitsubishi Shipping Company ordered 9 vessels which were monopolized by the three Mitsubish Companies.

In the case of the Mitsui Shipbuilding and Engineering Company, out of a total of 28 vessels built, 17 were ordered by the Mitsui Steamship Company and 3 were from the Meiji Shipping Company which belongs to the Mitsui interests. Again, the Mitsui Shipbuilding and Engineering Company monopolized a total of 17 orders from the Mitsui Steamship Company and also vessels of the Meiji Shipping Company and Inui Steamship Company were ordered to Mitsui Shipbuilding and Engineering Compang or Fujinagata Shipbuilding Company which belong to the same Konzern, respectively.

In the case of the Kawasaki Dockyard Company, in the Daiichi Bank group, out of its total of 21 vessels built, 10 were ordered from Kawasaki Kisen Kaisha and 2 from Nittetsu Steamship Company in the Daiichi Bank group. On the contrary, Kawasaki Kisen Kaisha built all of its vessels at the Kawasaki Dockyard Company.

Harima Shipbuilding and Engineering Company out of its total of 22 vessels, 5 were for Iino Kaiun Kaisha in the same Daiichi Bank group and 3 each for Nitto Shosen Company and Terukuni Kaiun Company; respectively.

Ishikawajima Heavy-Industries Company has no particular shipowners it seems but out of its total of 9 vessels, 2 were built for Kyoritsu Steamship Company and Nittetsu Steamship Company respectively.

To these three shipbuilding companies known to belong to the Daiichi Bank group, orders from shipping companies in the same group for instance, in the case of Iino Lines, 11 out of 16 including those built at Iino Heavy-Industries Company and 7 out of 8 for the Nitto Shosen Company.

The Hitachi Shipbuilding and Engineering Company in the Sanwa Group, out of its total of 35 vessels built received orders for 11 from Yamashita Steamship Company, 5 from Ocean Transportation Shipping Co., 6 from Shin Nippon Steemship Co., all in Sanwa group Shipping Companies.

On the other hand, Yamashita Steamship Co. ordered 11 out of 12, Ocean Transportation Co. all 5 to the Hitachi Shipbuilding and Engineering Company.

The Japan Steel & Tube Company in the Fuji Bank group built 6, out of its total of 17, for Nissan Kisen Kaisha which, on the other hand ordered 6 out of 8 to Japan Steel & Tube Co.

As shown above, the connection between shipbuilding and shipping industries through orders and construction is tight especially among big businesses such as Mitsubishi and Mitsui which belonged to former Zaibatsu Konzern and also is fairly clear among other big Companies.

And such connections are, it must be noticed not limited only to monopolistic shipbuilding companies and giant shipping Companies. The reason is as follows.

The post-war domestic position of pre-war big shipping companies that is leading or dominant operators, has declined because of the loss of accumulation of funds caused by the withdrawal of government indemnification of war losses and because of the restriction according to the principle of equal allocation in the Shipbuilding Program. The degree of concentration of tonnage owned by them, as shown in Table 11, is extremely small compared to that of pre-war days. On the other hand, other small owners of pre-war

Table 11. Concentration ratio of Ships held

	(A) Pre-war Total Tonnage	Concentration ratio
Nippon Yusen Kaisha	635,284	24.4%
Osaka Shosen Kaisha	512,307	19.7
Kokusai Kisen Kaisha	160,992	6.2
Kinkai Yusen Kaisha	153,706	5.9
Mitsui Bussan	149,690	5.8
Total	1,611,929	62.0
Grand total	2,601,863	100
	(B) Post-war Total Tonnage	Concentration ratio
Iino Kaium Kaisha	237,795	6.4%
Nippon Yusen Kaisha	208,640	5.6
Osaka Shosen Kaisha	191,967	5.2
Mitsui Steamship Co.	188,524	5.1
Nitto Shosen Co.	120,709	3.2
Total	947,635	25.5
Grand Total	3,724,645	100

Note: ① Pre-war 1937, 1,000 g. t. over.
② Post-war 1956, 100 g. t. over.

days so-called, "one vessel owner," found it difficult to build new ships because of the rise in the price of vessels.

Thus, the leading operators, who have connections with banks but cannot build ships because of the limits in the Shipbuilding Program, have worked out a device by which to charter and operate the newly built ships of small owners for the construction of which the operator has introduced his bank, guaranteed the loan and provided the facilities of dockyards.

In this way, the scale of owners becomes large, and as the Shipbuilding Program goes on, the so-called grouping, headed by the dominant operator, has gone on inevitably. For example, this trend as to N. Y. K., O. S. K. and Kawasaki Kisen Kaisha is shown in Chart 3. Those in (A) are companies in groupings in the management of which the parent company participates, and in (B) are companies in groupings in a wide sense with which the parent company has a business connection through the above mentioned means. The number of the latter type is very large.

Chart 3.

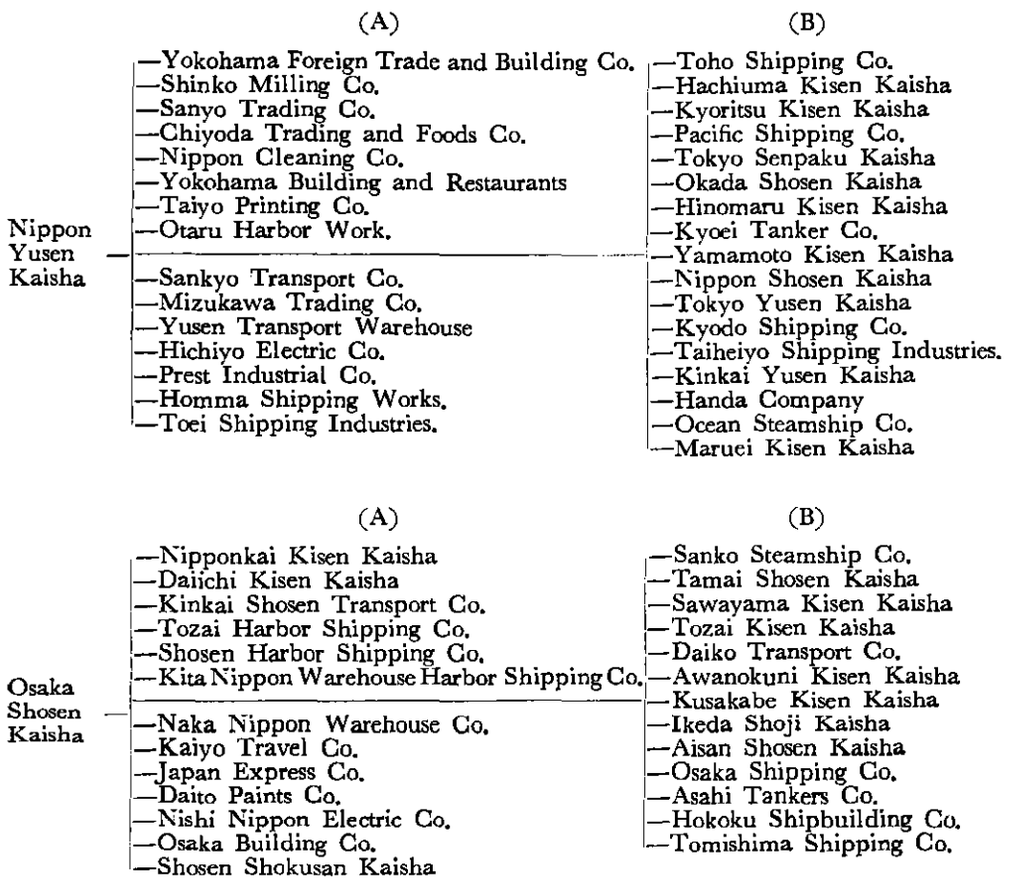
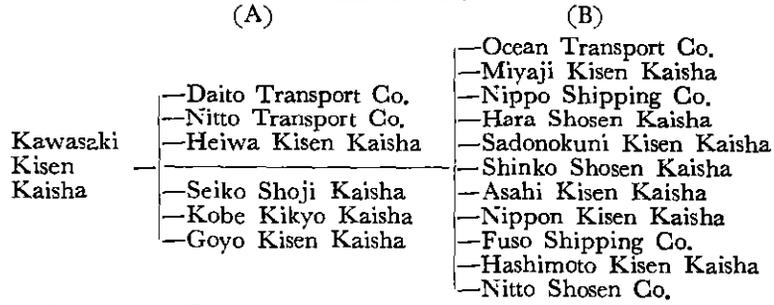


Chart 3 cont.



Note: (A) Proper group company
(B) Management or business relationship

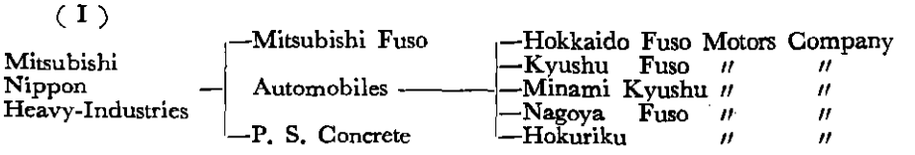
Now, if we look at this situation of the grouping of owners by the dominant operator, from the side of the big shipbuilding companies which combines with the operator, it can be said that the big shipbuilding companies can now surely receive the orders for construction from not only the operator but also from owners in the same group. Thus, the reorganization of shipping circles is, in this sense, simultaneously related to the expansion and stability of the market for shipbuilding monopolies.

As we have shown above, the grouping in the shipping industry has gone on inevitably. Then, what are the relationships between, giant shipbuilding corporations and small and medium shipbuilding companies?

Generally speaking, monopolistic corporations which suffered from excess capacity, could not afford to form its own group to utilize small and medium-sized shipyards. Therefore, the grouping in shipbuilding circles was rare except in such cases as Mitsui and Fujinagata, both of which belong to the same Konzern or Ishikawajima and Tokyo Shipbuilding Company which already had connections from the outset. There are however, some movements towards grouping, due to a large amount of orders for export vessels after 1955 such as Urage Dock Co. which helped to rebuild and which participated in the management of Nipponkai Heavy-Industries Co., Tohoku Shipbuiliding Co. and Miura Shipbuilding Co., But this did not prove to be a general trend.

In contrast to this, there are marked trends towards the advance of monopolistic shipbuilding companies for many-sided production and the participation in the management of industries other than shipbuilding. Chart 4 shows the companies in which monopolistic companies participates.

Chart 4.



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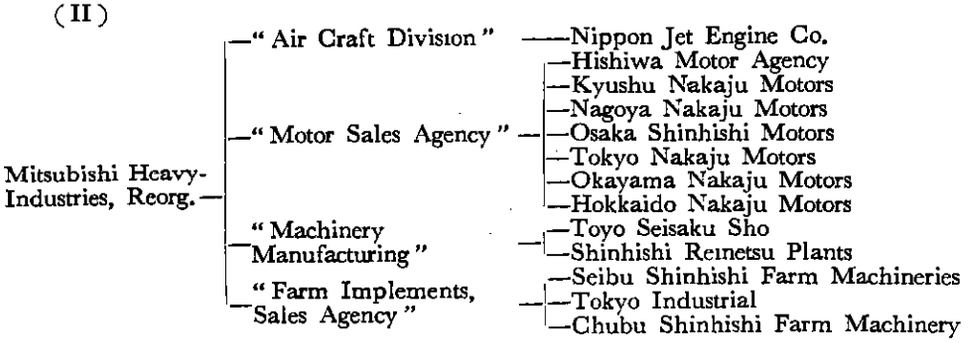

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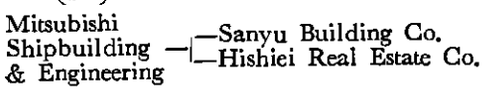

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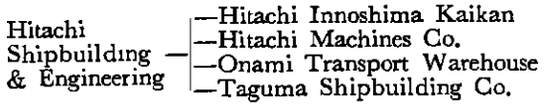

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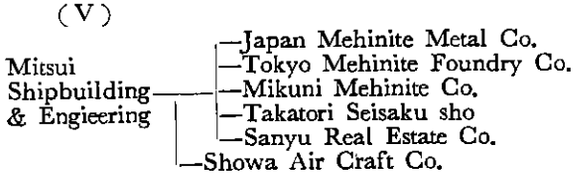
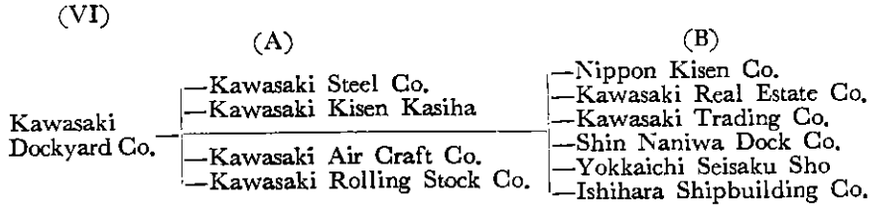
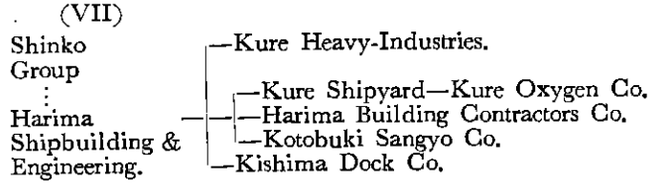


(VI)



Note: (A) So-called "Kawasaki Hevay-Industries Konzern."
(B) Group Company from Kawasaki Dockyard Co.

(VII)



(VIII)

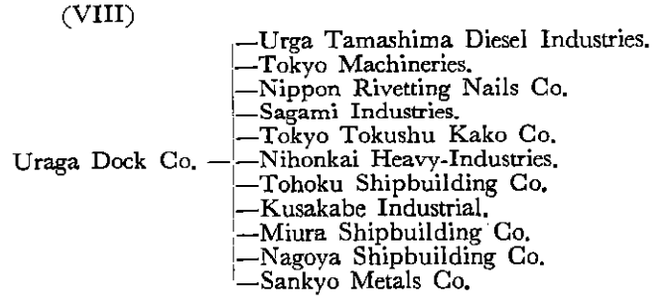
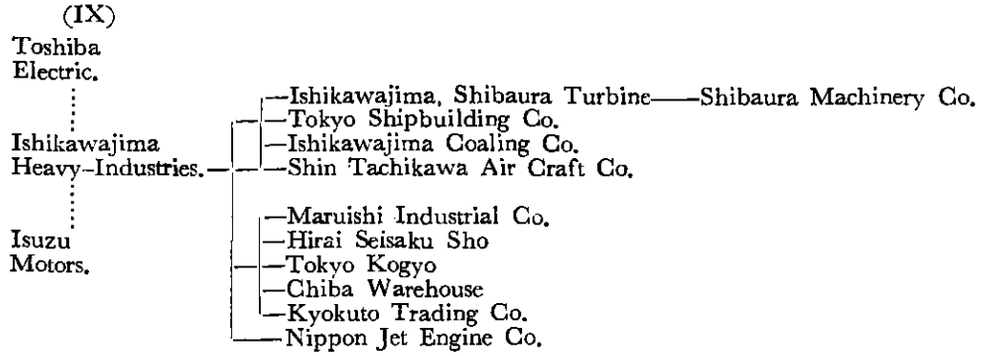


Chart 4. continued



Of course, they engage in various business from trading to manufacturing and the scope and scale of participation is different according to the companies but roughly, they can be divided into Mitsubishi Shipbuilding and Engineering type and the Urage Dock type. Mitsubishi Shipbuilding and Engineering Co. has a few companies in its group in which it participates. They are Sanyu Building Co. and Hishiei Real Estate Co. which are independent divisions for welfare facilities. The same type is seen in the other two Mitsubishi companies and in the Hitachi Shipbuilding and Engineering Company. In the case of the Mitsubishi Heavy-Industries Reorganized, Co., the companies in this group are apparently many but they are chiefly in trading business and a few in manufacturing. On the contrary, the Uraga Dock Co. has companies of various kinds in its group, all of which are in manufacturing. The same can be said of Ishikawajima Heavy-Industries Co.

These differences in scope and scale of management participation in enterprises other than shipbuilding have some relationship with the many-sided production which the big shipbuilding company operates within itself. The reason why the three Mitsubishi companies are slow in grouping seems to reflect the development of many-sided production within them; they can produce not only the products which other firms might order outside but also such products as general machinary, iron frames, rolling stock, which have no direct relation to ships and also reflect the power of the Konzern in that they can be purchased cheaper outside than other firms even if they do not share in the capital. In such combined heavy industrial capital as Mitsubishi Heavy-Industries Reorg. the tempo of the rise in output is much faster in other branches than in the shipbuilding branch. Then again the relationship between Urage Dock Co. and Ishikawajima Heavy- Industries Co. to their machinery manufacturing companies in their groupings; the Kawasaki Dockyard case, and also the relationship of Mitsui Shipbuilding and Engineering Company to Showa Air Craft Co. may be looked upon as being

similar to the relationships existing within the Mitsubishi Heavy-Industries, Reorg. in which some have independent managemont or capital is shared in other divisions and enterprises.

At any rate, the narrowness of the domestic market and the instability of the market makes the groupings in the shipbuilding industry stagnant and at the same time, the same causes make shipbuilding companies actively advance towards many-sided production and towards the control of enterprises or grouping in other industries. Thus, strengthening itself as general heavy industrial capital or in the development of the formation of Konzerns with shipbuilding as its core.

In the foregoing pages, I have made an analysis focusing on the rationalization and groupings(formation of Konzern)which were the primary factors in the revival and development of post-war monopolies in the shipbuilding industry, Lastly, I shall make some comments on the latest trends.

The post-war increase in shipbuilding capacity and the weakened and narrowed domestic market, have necessarily promoted the rationalization and grouping in other industries. It is a well known fact that rationalization has the contrary effect of enlarging the shipbuilding capacity and the recent fall in shipping markets have disclosed the weakness in Japanese shipping. Therefore, monopolistic shipbuilding companies must more and more depend upon foreign markets. But the recent over-all depression in shipping has greatly diminished the amount of newly received orders and also has often had cancellations of orders and changes in the contents of contracts.

On the other hand, facing the decreased amount of orders for export ships, attempts to stabilize and secure foreign markets by getting more orders from stable international oil trusts, instead of orders from speculative Greek ship owners and attempts by Ishikawajima, Kawaski and Hitachi Companies to export capital to underdeveloped countries such as Brazil, Portugal and India are seen and the strengthening of many-sided production and of combination among the same Konzern or grouping are made inevitable. The establishment of an export committee through the cooperation of Mitsubishi Companies is a typical example.

Moreover, a noteworthy fact is the growth of cooperative efforts for research in nuclear-powered ships, shown in HIJAP (Hitachi-Iino Joint Atomic Panel) and the Daiichi Atomic Energy Research Group by the Daiichi Bank group including Kawasaki Dockyard Co. as pointing towards new trends in cooperation and grouping.